NOTICE

All drawings located at the end of the document.

TABLE OF CONTENTS FOR ENVIRONMENTAL RESTORATION PROGRAM DIVISION ADMINISTRATIVE PROCEDURES MANUAL

ADMIN RD

Jan 10-29-94

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DOCUMENT MODIFICATION REQUEST (DMR)

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8 Item	9 Page	10 Step	11 Proposed Modifications
1	18 of 20	5 2	Add columns to Table 7 which indicates the laboratory detection limit and threshold value for each sample

12 Justification (Reason for Modification EJO# TP# etc)

The report limit provided by each laboratory varies from facility to facility Obtaining a detect in the blank may solve nothing without the reported detection limit and without a threshold value, therefore these must be added to the table

If modification is for a new procedure or a revision list concurring disciplines in Block 13 and enter N/A in Blocks 14 and 15 If modification is for any type of change or a cancellation organizations are listed in Block 13 then Concurror prints and signs in Block 14 and dates in Block 15

13 Organization	14 Print and Sign (if applicable)	15 Date (if applicable)
QS	Steve Luker	9.20.94
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Steve Luker S LUKER 9 20 94

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DOCUMENT CLASSIFICATION REVIEW WAIVER
PER R D HOFFMAN, CLASSIFICATION OFFICE
JUNE 11, 1991

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ROCKY FLATS PLANT
2-G32-ER-ADM-08.02

REVISION 0

EVALUATION OF ERM DATA FOR USABILITY IN FINAL REPORTS

APPROVED BY A R Kuil (for SGS) / S R. KEITH / 9-15-94
Associate General Manager, EG&G Environmental Restoration Management — Print Name (for SG STIGER) — Date

S Luker / S LUKER / 9.15.94
Quality Assurance Program Manager, EG&G Environmental Restoration Management — Print Name — Date

States that to the best of my knowledge, the necessary and sufficient Requirements, Codes, and Standards are met.

CONCURRENCE BY NA / /
Assistant Manager, Environmental Restoration Division, DOE, Rocky Flats Field Office — Print Name — Date

Environmental Protection Agency Approval Required ☐ Yes ☑ No

Responsible Organization Environmental Restoration Effective Date 10/21/94

CONCURRENCE BY THE FOLLOWING DISCIPLINES WILL BE DOCUMENTED IN THE PROCEDURE HISTORY FILE

Data Management and Reporting Services
Environmental Documentation
ERM Solar Pond Projects

USE CATEGORY 4

ORC review not required

Periodic review frequency 1 year from effective date

DOCUMENT CLASSIFICATION REVIEW WAIVER
PER R B HOFFMAN, CLASSIFICATION OFFICE
JUNE 11, 1991

LIST OF EFFECTIVE PAGES

Pages	Effective Date	Change Number
1-20	10/21/94	94-DMR-000404
18	10/21/94	94-DMR-001986

TOTAL NUMBER OF PAGES 20

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1. PURPOSE

The purpose of this procedure is to provide a means by which a final evaluation of data quality at the project level can be performed before use in a final Environmental Restoration Management (ERM) report Subsequent to the validation of the laboratory data, this protocol will evaluate final usability of the project data Use of this procedure will ensure that the level of compliance with Data Quality Objectives (DQOs) is clearly communicated in final ERM reports

2. SCOPE

This procedure applies to all EG&G Rocky Flats, Inc (EG&G) employees and subcontractors who use data collected at the project level to support environmental decision documents This procedure is based on the relationship of data to the DQOs Stated simply, the data are usable without qualification if project-specific DQO criteria are met, otherwise, use of data must be qualified Within the context of this procedure, *usability* is synonymous with *adequacy* when evaluating radiochemistry data

This procedure includes the consideration of laboratory qualifiers and codes assigned during the validation process but is more robust and includes evaluation of all project-specific DQOs Data validation is performed by an independent, third-party subcontractor to ensure that the proper chemistry laboratory protocols are followed

This procedure is based on requirements set forth in the Quality Assurance Project Plan (QAPjP) Manual (EG&G 1989), Department of Energy (DOE) Data Management Requirements (DOE 1993), and Environmental Protection Agency (EPA) Guidelines (EPA, 1980, 1987, 1989, 1993a, 1993b) Specifically, precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters are required based on the QAPjP (EG&G 1989), DOE Data Management Requirements (DOE, 1993), and EPA Guidelines (EPA, 1987) The 7-Step Process, which is the latest EPA guidance on the DQO process, is addressed in EPA 1993a and EPA 1993b

3. DEFINITIONS AND ACRONYMS

3.1 Definitions

Accuracy. A quantitative measure of data quality that refers to the degree of difference between measured or calculated values and the true value of a parameter The closer the measurement to the true value, the more accurate the measurement

Comparability. A qualitative measure defined by the confidence with which one data set can be compared to another Statistical tests may be used for quantitative comparison between sample sets (populations)

3.1 **Definitions (continued)**

Completeness. A quantitative measure of data quality expressed as the percentage of valid or acceptable data obtained from a measurement system

Data Quality Objectives (DQOs). Statements that outline the decision-making process and specify the type, quality, and quantity of data required to support decisions

Data Validation. The total process of determining adequacy and usability of the data obtained

Duplicate. One of two homogenous samples taken from the same source at the same time and analyzed under identical conditions

Field Replicate. One of two contiguous grab samples taken from the same source at the same time and analyzed under identical conditions [such as a volatile organic compound (VOC) sample of soil]

Precision. A quantitative measure of data quality that refers to the reproducibility or degree of agreement among replicate or duplicate measurements of a parameter The closer the numerical values of the measurements are to each other, the lower the relative percent difference and the greater the precision

Relative Percent Difference (RPD). A measure of precision, which is based upon the mean of two values from related analyses and is reported as a percentage (the equation is given in Step 5 1 1[2], as Equation 1) The RPD requirements are stated in the Work Plan before field sampling occurs

Representativeness. A qualitative characteristic of data quality defined by the degree to which the data absolutely and exactly represent the characteristics of a population Reproducibility is accomplished by obtaining an adequate number of samples from appropriate spatial locations within the medium of interest

Subject-matter Expert (SME). An identified person who is knowledgeable in a specific field of interest

3 2 **Acronyms**

DOE	United States Department of Energy
DQOs	Data Quality Objectives
EG&G	EG&G Rocky Flats, Inc
EPA	United States Environmental Protection Agency
ER	Environmental Restoration
ERM	Environmental Restoration Management

3.2 Acronyms (continued)

Ft BGS	Feet Below Ground Surface
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
MDL	Method Detection Limit
µg/L	Micrograms Per Liter
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PCE	Perchloroethene (tetrachloroethene)
PM	Project Manager
QAPjP	Quality Assurance Project Plan
QC	Quality Control
RFEDS	Rocky Flats Environmental Database System
RPD	Relative Percent Difference
SAP	Sample Analysis Plan
SME	Subject-matter Expert
SOPs	Standard Operating Procedures
TCE	Trichloroethene
VOC	Volatile Organic Compound

4. RESPONSIBILITIES

4.1 Project Manager (PM), Subject-matter Expert (SME), or Designee

Is responsible for the implementation of this procedure

5. INSTRUCTIONS

NOTE *The process described in these instructions is illustrated in Appendix 1, Process Flow for Evaluation of Data for ERM Usability*

PM, SME, or Designee

[1] Ensure that a peer reviewer documents verification of the calculations addressed in this procedure on the Document Review Sheet prepared in accordance with procedure 2-E02-ERM-ADM-05 05, Document Review Process

5.1 Data Validation Process

5.1.1 Determining Precision

PM, SME, or Designee

[1] For analytical data, assemble all results for field-duplicate and replicate samples, and the results from the corresponding real samples

[2] Calculate RPD values for the sample sets (identified above), using Equation 1

$$\text{Relative Percent Difference} = \frac{[C_1 - C_2]}{(C_1 + C_2)/2} \times 100 \qquad \text{(EQUATION 1)}$$

where

C_1 = Concentration of the analyte in the real sample
C_2 = Concentration of the analyte in the duplicate

[3] Summarize the RPD values in a tabular format with results broken out by matrix type and analytical suite

[A] Include the following in the summary

- Calculated RPD values
- Overall percentages of sample sets that comply with the established precision DQOs

Some examples of matrix types and analytical suites are listed in Table 1, Common Examples of Matrix Types and Analytical Suites An example of the calculated RPD values is provided in Table 2, Calculated RPD Values An example of the summary is provided in Table 3, Summary of RPDs

5.1.1 Determining Precision (continued)

PM, SME, or Designee (continued)

[4] State the precision of each field or physical measurement type that ultimately influences project decisions

Examples of field and physical measurements include the following

- Flow rate
- Temperature
- Displacement
- Pressure
- Mass

NOTE *Typical RPD values for water are ≤ 30%, for soil ≤ 40% At least 85% of all quality control samples are required to comply with the established precision, or RPD, goals*

[5] **IF** the calculated RPD or the overall precision values for the collected samples do **NOT** fall within the accepted control limits for Precision,
THEN:

[A] Indicate how precision does not comply with DQO specifications

[B] Explain and justify the deficiencies

[C] Determine if additional sampling is required based on direction from DOE

TABLE 1
COMMON EXAMPLES OF MATRIX TYPES AND ANALYTICAL SUITES

Matrix Type	Analytical Suites
Air	Volatile Organic Compounds
Biota	Semi-Volatile Organic Compounds
Groundwater	Metals (inorganics)
Sediment	dissolved
Soil	total
Surface Water	Cyanide
	Radionuclides
	dissolved
	total
	Pesticides/Polychlorinated Biphenals (PCBs)
	Water Quality
	total dissolved solids (TDS)
	nitrates/nitrites
	other anions
	field parameters
	pH
	temperature
	specific conductivity
	dissolved oxygen

TABLE 2
CALCULATED RPD VALUES

	Media	Detected Analyte	QC Sample Type	Associated Real Sample ID	QC Sample Result	Real Sample Result	RPD Value
QC Sample ID							
GW02479IT	Water	TCE	DUP	GW02437IT	110 µg/l	100 µg/l	9 5%
GW02586IT	Water	TCE	DUP	GW02440IT	84 µg/l	54 µg/l	43%
GW02603IT	Water	TCE	DUP	GW02601IT	250 µg/l	281 µg/l	11 3%

TABLE 3
SUMMARY OF RPDs

Analyte	Medium	Required RPD Value	Total Duplicates Collected	Number of Duplicates within the RPD	Overall Precision Compliance
TCE	Water	≤ 30%	3	2	67%[A]
Vinyl Chloride	Soil	≤ 40%	15	13	86%

[A] 28 of the 32 RPD values were within the 30% tolerance, 28/32 x 100 = 88%

5.1.2 Determining Accuracy

PM, SME, or Designee

[1] For analytical data, compare the required analytical method and detection limit with the actual method used and its detection limit for each medium and analyte

Table 4, Comparison of Detection Limits, serves as an example for volatile organic analytes, Required Detection Limits (RDLs) for radiochemicals are given in the General Radiochemistry and Routine Analytical Services Protocol (GRRASP) Manual, Part B

5 1 2[1] EXAMPLE—Analytical Method and Detection Limit Comparison

The Sampling Analysis Plan (SAP) requires that method 502 2 be used for analyzing VOCs in water at an Operable Unit For vinyl chloride, the data from RFEDS indicate that the actual analytical method used was not the same as the required analytical method, and therefore, does not meet the method detection limit (MDL) requirement as identified in the GRRASP Manual, Part A Therefore, the analytical results for vinyl chloride must be qualified as having an actual MDL of 0 18 µg/L (EPA Method 601) in contrast to the planned EPA Method 502 2 (MDL of 0 01 µg/L)

TABLE 4
COMPARISON OF DETECTION LIMITS

Analyte	Required Analytical Method	Actual Analytical Method	Required MDL[A] (µg/L)	Actual MDL (µg/L)
PCE	502 2	502 2	0 02	0 02
TCE	502 2	502 2	0 03	0 03
Vinyl Chloride	502 2	601	0 01	0 18

[A] In this example, the MDL is the Required Detection Limit

5.1.2 Determining Accuracy (continued)

PM, SME, or Designee (continued)

[2] For field or physical measurements, state the accuracy of each measurement type that ultimately influences project decisions

Examples of field and physical measurements include the following

- Flow rate
- Temperature
- Displacement
- Pressure
- Mass

NOTE *Accuracy is based on detection limits such as from GRRASP specifications, manufacturer's specifications, standard operating procedures, or instrument-specific calibration data Table 5, Water Level Results, serves as an example*

[3] Evaluate the correct resolution of all reported results as well as the number of significant figures, and report all of the corresponding measurements or calculation results (for example, numerical model output) consistently

5 1 2[3] EXAMPLE—Appropriate Resolution and Significant Figures

According to the 5-21000-OPS-GW 1, Rev 2, water levels are to be measured within 0 01 ft The results obtained through the use of a *Solinst* Water-Level Probe, from a sampling round of water-level measurements for six monitoring wells, are listed in Table 5 The data will be used for modeling the potentiometric surface of a shallow aquifer

The data reported for MW-80 must be qualified for further use in data reduction and analysis because it does not reflect the required measurement resolution (0 01 ft) or accuracy (0 05 ft) Likewise, the MW-83 data must be rounded to the appropriate resolution and significant figures because it reflects measurement capabilities to 0 001 ft, which is not within the resolution of the water-level measuring device

5.1.2 Determining Accuracy (continued)

TABLE 5
WATER LEVEL RESULTS

Monitoring Well Number	Date Measured	Top of Water (Ft BGS)	Bottom of Well (Ft BGS)
MW-78	12/05/93	16 34	22 81
MW-79	12/05/93	18 01	24 22
MW-80	12/05/93	15 9	21 4
MW-81	12/05/93	16 02	22 69
MW-82	12/05/93	16 32	23 66
MW-83	12/05/93	17 230	25 450

PM, SME, or Designee (continued)

[4] **IF** any accuracy tolerance does **NOT** comply with DQO specifications, **THEN:**

[A] Indicate how accuracy does not comply with DQO specifications

[B] Explain and justify the deficiencies

[C] Determine if additional sampling is required based on direction from DOE

5.1.3 Determining Representativeness

PM, SME, or Designee

[1] Compare the actual sample types and quantities collected with those stated in the Work Plan per media type and analytical suite and/or per physical measurement type

A tabular format is recommended to clearly communicate this information An example is shown in Table 6, Sample Comparison (Required-vs-Actual)

5.1.3 Determining Representativeness (continued)

TABLE 6
SAMPLE COMPARISON (REQUIRED-VS-ACTUAL)

	Required Number of Samples per Sampling-Plan Specifications	Actual Number of Samples	Deviation	Justification
Surface Soils				
Radionuclides	30	35	+5	Extra samples within budget, DOE approved
Metals	20	20	0	
Semi-Volatile Organic Compounds	25	25	0	
Groundwater				
Metals	12	10	-2	Not enough sample medium to fulfill requirements
Radionuclides	12	12	0	

PM, SME, or Designee (continued)

[A] **IF** a particular analyte within an analytical suite is **NOT** collected or measured, **BUT** the bulk of the analytes was collected or measured,
THEN footnote those analytes **NOT** collected and explain in the summary

For example, *gross alpha/beta* are analytes within the radionuclide analytical suite, which may additionally contain $^{239/240}Pu$, $^{233/234,235,238}U$, ^{3}H, $^{230/232}Th$, and ^{241}Am

5.1.3 Determining Representativeness (continued)

PM, SME, or Designee (continued)

[2] **IF** actual sample types and quantities do **NOT** follow associated sample-controlling documents (such as the Work Plan),
THEN:

[A] Indicate how representativeness does not comply with DQO specifications

[B] Explain and justify the deficiencies

[C] Determine if additional sampling is required based on direction from DOE

5.1.4 Determining Completeness

[1] Review analytical data with respect to matrix type and analytical suite, specifically
- For real samples
- For Quality Control samples

[2] Use Equation 2 to calculate completeness for all data types that contribute to project decisions, including the following
- Water-level measurements
- Periodic flowrates
- Temperatures

$$\text{Completeness} = DP_u = \frac{DP_t - DP_n}{DP_t} \times 100 \qquad \text{(EQUATION 2)}$$

where

DP_u = Percentage of usable data points
DP_n = Nonusable data points
DP_t = Total number of data points

Example

DP_u = usable VOC soil samples
DP_n = 8 nonusable VOC soil samples
DP_t = 46 total number of VOC soil samples collected

$$\text{Completeness } DP_u = \frac{46 - 8}{46} \times 100$$

$$DP_u = 83\%$$

Without 90% as a goal, $DP_u < 90\%$ Therefore, the soil sampling program is considered to be incomplete and additional VOC samples may be required to fulfill the Field Sampling Plan

5.1.4 Determining Completeness (continued)

PM, SME, or Designee (continued)

[3] **IF** actual sample types and quantities do **NOT** follow associated sample- controlling documents (such as the Work Plan),
THEN:

[A] Indicate how completeness does not comply with DQO specifications

[B] Explain and justify the deficiencies

[C] Determine if additional sampling is required based on direction from DOE

5.1.5 Determining Comparability for Analytical Chemistry and Radionuclide Data

PM, SME, or Designee

[4] Demonstrate comparability of data sets with respect to one or more of the following commonalities

- Protocols (such as procedures) used to collect or synthesize the samples
- Matrix types (such as soil vs water)
- Temporal considerations (periodical, seasonal, event-related)
- Spatial considerations (3-dimensional)

NOTE *Comparability is required to include at a minimum the comparison of real samples with*

- *Other real samples, as appropriate*
- *Background data*

[5] **IF** actual sample types and quantities do **NOT** follow associated sample-controlling documents (such as the Work Plan),
THEN:

[A] Indicate how comparability does not comply with DQO specifications

[B] Explain and justify the deficiencies

[C] Determine if additional sampling is required based on direction from DOE

5.2 Comparison of Environmental Samples with Blanks (Quality Control Samples)

PM, SME, or Designee

[1] **WHEN** completing this section,
THEN consider all quality control (QC) samples collected during the field project, except duplicates and replicates, including the following

- Trip blanks
- Rinsates
- Preservation blanks
- Any other field blanks

[2] **IF** a detected analyte is a common laboratory contaminant,
AND the real sample concentration is less than 10 times the blank concentration,
THEN conclude that the potential contaminant of concern is a laboratory contaminant in the real sample

[3] **IF** a detected analyte is a common laboratory contaminant,
AND the real sample concentration is greater than or equal to 10 times the blank concentration,
THEN conclude that the analyte in the real sample is a true detect (US EPA, 1989)

[4] **IF** a detected analyte is **NOT** a common laboratory contaminant,
AND the real sample concentration is less than 5 times the blank concentration,
THEN conclude that the potential contaminant of concern is a laboratory contaminant in the real sample

[5] **IF** a detected analyte is **NOT** a common laboratory contaminant,
AND the real sample concentration is greater than or equal to 5 times the blank concentration,
THEN conclude that the analyte in the real sample is a true detect (US EPA, 1989)

[6] **IF** the source of detected contamination from real or QC samples is inconclusive,
THEN compare lot numbers of sampling containers used for real samples with analytical results for the same lots of sample containers produced by the laboratory

This process should determine if the sample containers are the source of contamination

[7] Summarize the QC sample data by listing in tabular format the parameters listed in Table 7, QC Sample Summary, with respect to matrix type and analytical suite

This table is an example of format only

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5.2 Comparison of Environmental Samples with Blanks (Quality Control Samples) (continued)

TABLE 7
QC SAMPLE SUMMARY

	QC Sample Type	Date of QC Sample Collection	Assoc Real Sample ID	Date of Real Sample Collection	QC Sample Result	Real Sample Result	Measured Units	Detect in Blank (yes/ no)	Detection Limit	Threshold Value
QC Sample ID										
QC Sample ID										
QC Sample ID										

5.3 The Seven-Step DQO Process (EPA, 1993)

PM, SME, or Designee

[1] **IF** the Seven-Step DQO process was initiated at the project's beginning,
THEN compare report conclusions with the decisions and decision-error tolerances stipulated by the project DQOs

[2] Explain and justify any discrepancies between the DQOs and inadequacies of information and conclusions stated in the report

6 RECORDS

There are no quality or non-quality records generated by this procedure

7. REFERENCES

DOE, 1993, Data Management Requirements, Section 5, Management Procedures and Requirements, U S Department of Energy Rocky Flats Plant Environmental Restoration

EPA, 1993a, Guidance for Planning for Data Collection in Support of Environmental Decision Making Using the Data Quality Objectives Process, Interim Final, Office of Research and Development, Washington D C , EPA QA/G-4

7. REFERENCES (continued)

EPA, 1993b, Data Quality Objectives Process for SUPERFUND Interim Final Guidance, Office of Solid Waste and Emergency Response, Washington D C , EPA 540-R-93-071

EPA, 1989, Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Office of Emergency and Remedial Response, Washington D C , EPA/540/1-89/002

EPA, 1987, Data Quality Objectives for Remedial Response Activities, Development Process, Office of Emergency and Remedial Response, Washington D C , EPA/540/G-87/003

EPA, 1980, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80, Washington, DC

EG&G, 1991, General Radiochemistry and Routine Analytical Service Protocol, Parts A and B, EG&G Rocky Flats, Golden, CO

EG&G, 1989, Rocky Flats Plant Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigations/Feasibility Studies and RCRA Facility Investigations/Corrective Measures Studies Activities, EG&G Rocky Flats, Golden, CO

5-21000-OPS-GW 01, Water Level Measurements in Wells and Piezometers

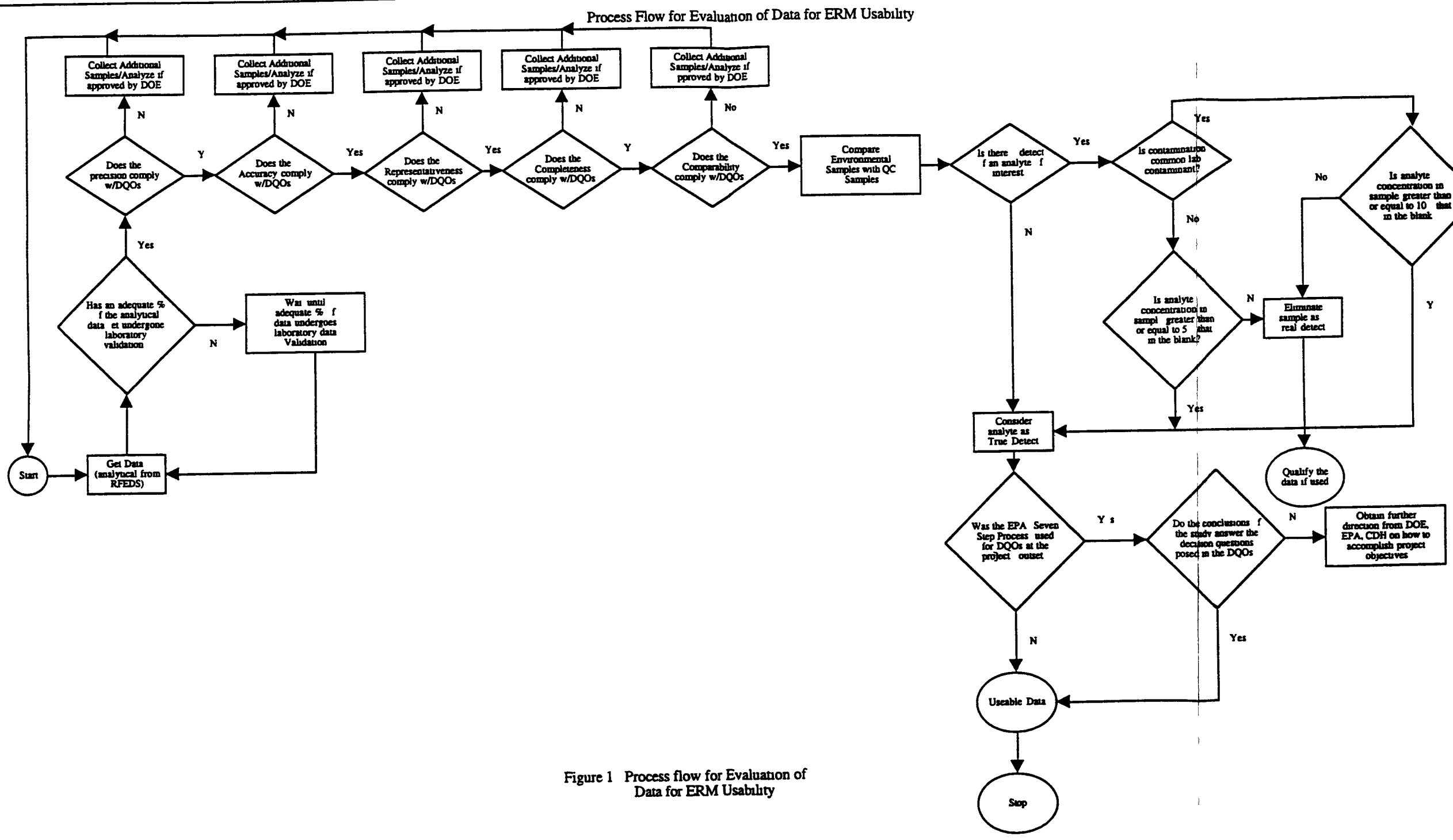

Figure 1 Process flow for Evaluation of Data for ERM Usability